

**DEVELOPING MONETARY MEASUREMENTS FOR PERHENTIAN ISLAND'S  
ENVIRONMENTALLY SUSTAINABLE ACCOUNTING STATEMENT**

**by**

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## ABSTRACT

The paper is based on one of many components of an on-going research conducted at Perhentian Island, Terengganu Malaysia. The main purpose of the study is to improve an environmental accounting framework's reporting tool called Environmentally Sustainable Accounting Statements (ESAS) by means of developing monetary measurement techniques of converting the physical units of degradation elements into monetary value. The ESAS basically borrows several concepts from macro and micro levels environmental accounting areas namely the Index of Sustainable Economic Welfare, Genuine Progressive Indicator and the Sustainability Assessment Model. The ESAS generates two main outputs; (1) Environmentally Sustainable Accounting Income Statement (ESAIS) and (2) Environmentally Sustainable Accounting Balance Sheet (ESABS). The central idea of ESAIS is to estimate *real* income where it takes accounts on environmental degradation elements while computing tourism site's earnings. While ESABS follow the format of an organization's Balance Sheet which estimates the value of assets, liability and equity of a tourism site. However, techniques to measures and convert the environmental degradation elements into monetary value are yet to be developed. Therefore, the focus of this paper is to dictates the notions of improving the ESAS by developing techniques to account for natural asset degradation and methane (CH<sub>4</sub>) emission caused by tourism activities.

*Keyword: Environmental accounting and monetary measurements.*

## **INTRODUCTION**

Tourism plays crucial roles for many countries in regards to job creation, infrastructure development and most importantly contribution to nation's income. For example, World Tourism Organization (UNWTO) (2013) reported that the United States of America, Spain, France and China were the top 4 earner for international tourism receipt in 2012 with USD126, USD55.9, USD53.7 and USD50 billion respectively. Subsequently, the year 2012 is significant for the global tourism sector when it recorded more than 1 billion of international tourists' arrivals worldwide and Malaysia was among the top 10 world destinations with France leading the category (World Tourism Organization (UNWTO), 2013). Unfortunately, tourism also attributes to undesirable social, cultural and environmental consequences (Timur & Getz, 2009; Tuna, 2011). Many studies have documented unfavourable outcome of tourism activities such as degradation of environment by means of greenhouse gasses emission (Becken & Patterson, 2006), natural assets over exploitation (Kuniyal, 2002), wildlife dependency on food resources provided by tourists (Langley, 2002), destructions of coral reefs and its inhabitants (Anisah & Zulfigar, 2010) and overflowing of solid wastes (Hashim et al., 2012).

Sustaining the capability of tourism site is crucial due to the fact that damaging the natural assets/environment to a point where it can no longer 'healed', may obliterate future prospect for that particular tourism site itself. On the other hand, it is unlikely to have any sort of tourism activities without impacting the environments. Therefore, the question is, to what extent do these activities are allowed to occur? By adopting the weak sustainability concept, it is believed that manufactured capital can be substituted for losses in natural capital (Bartelmus, 2009; Dietz & Neumayer, 2007; Tisdell, 2001).

Consequently, from the author's point of view, it could be argued that the weakest form of tourism sustainability is as long as benefit exceeds cost, the damages (limiting to recoverable state) may be tolerated. To evaluate this, benefits and costs must first be defined and quantified. Several environmental accounting approaches have been known to quantify undesirable outcome of economics activity have on the natural environment. One of the recently developed framework called Environmentally Sustainable Accounting Statements (ESAS) (Rosmini, Forgie, & Khalizul, 2012) has put forward notions to take account on these factors in calculating tourism income which were disregarded by the conventional estimation. Even though the ESAS has put forth notions for monetization of several degradation elements (solid waste emissions and natural assets depreciation), the techniques are yet to be developed.

Therefore, the main purpose of the study is to discuss on the ways to improve the original ESAS framework by means of developing monetary measurement techniques of converting degradation elements physical units of into monetary value. In pursuing the focal goal of the study, the objectives are concern with developing two techniques which will be incorporated into the reporting tool. They are:

- i. To identify variables (constraints of resources) to be inserted into the equation/model in developing conversion tool for methane (CH<sub>4</sub>) and depreciation method for natural assets.
- ii. To estimate methane (CH<sub>4</sub>) emission from landfill of the designated tourism site.
- iii. To carry out environmental valuation on the tourism site's natural assets.
- iv. To carry out carrying capacity assessment for designated tourism site.
- v. To construct the extended version of ESAS for Perhentian Island, Malaysia.

## **LITERATURE REVIEW**

Accounting for the environment has become a popular subject this last decade. Among familiar works, to name a few, are by Gray (2009; 2006; 2000; 2001), Bebbington (2007; 2007; 2003; 2001), Deegan (2007; 2002; 2010; 2011) that address issues pertaining how businesses should report environmental impact as a result of their daily operations. While at nation's level, the idea of estimating real or net income (income after deducting environmental degradation items) has been proposed as early as in the 1980's. El Serafy and Lutz (1989) suggested that efforts should focus on sustainable income which is the true income rather than calculating the national income (the GDP). Other recent studies in the area engaged in constructing environmental accounts at national scale (Bleys, 2008; Clarke & Islam, 2005; Costanza et al., 2004; Pulselli, Ciampalini, Tiezzi, & Zappia, 2006; Wen, Zhang, Du, Li, & Li, 2007). Meanwhile, tourism studies that concern with the environmental impact falls under the sustainable tourism area.

Sustainable tourism literatures currently focus more on how to measure these impacts through assessments such as carrying capacity (Lobo et al., 2013; Manning, 2002; Nation, 2003; Salerno et al., 2013; Teh & Cabanban, 2007; Yue, Tian, Liu, & Fan, 2008), ecological footprint (Feng, 2009; Lenzen & Murray, 2001; Li & Yang, 2007; Patterson, Niccolucci, & Marchettini, 2008), carbon footprint (Becken & Patterson, 2006; Druckman & Jackson, 2009; Dwyer, Forsyth, Spurr, & Hoque, 2010; Kuo & Chen, 2009) and water footprint (Cazcarro, Hoekstra, & Sánchez Chóliz, 2014; Ewing et al., 2012) of tourism sites. Other than that, there are studies that concern with tourism yield and its measurement. For example Dwyer dwell upon the economic return of tourism industry (Dwyer & Forsyth, 1997, 2008; Song, Dwyer, Li, & Cao, 2012) and tourism's environmental-economic trade-offs (Lundie, Dwyer, & Forsyth, 2007).

In many countries, estimating tourism yield or income constantly neglects the environmental degradation element caused by tourism activities. For example, the 'used' of natural assets such as beaches, caves, mountains, river and etc. for tourism activities affected the conditions of these assets. Consequently, another aspect that was occasionally overlooked in estimating tourism income is waste production. Naturally, the output of every human activity is waste. Huge quantity of solid waste produce every year has raised concern in regards to earth capability in absorbing these unwanted residues (Mamouni Limnios, Ghadouani, Schilizzi, & Mazzarol, 2009). Tourism islands in Malaysia are said to have produced 400 metric tons of solid waste per day where 60 percent are collected and disposed at landfills, 35 percent are burned and 5 percent are dumped into the sea (Agamuthu & Nagendran, 2011). While studies conducted by Mohd Zaki (2004) for Tioman Island and M. Rafee and Owee (2007) for Perhentian Island indicated that growing number of tourists especially during holidays would normally resulted in bigger volume of waste disposed. This however, can be considered as an inevitable issues as with other tourism sites all over the world (Dwyer et al., 2010; Xiaojiang, 2008). The problem with waste is that while decomposing, one of the gases it releases is methane (CH<sub>4</sub>) which is one of the major contributors to global warming.

To account for natural asset degradation and methane (CH<sub>4</sub>) emission caused by tourism activities this, the study proposed to improve and extend the recently build an environmental accounting framework's reporting tool called Environmentally Sustainable Accounting Statements (ESAS) (Rosmini, Forgie, et al., 2012). Other proposal that was put forward with the same notion is by Andersson and Lundberg (2013). The aim of the study is to achieve commensurability by measuring impact including social and environmental, in unitary metric which is monetary. Even though sharing similar techniques in converting other metric unit

into monetary, e.g. ecological footprint and estimating tourist expenditure, the ESAS uses the business accounts structure as its presentations of information and employs life cycle costing concepts.

The ESAS, an approach which lies within the area of environmental accounting (abbreviated as EA this point forward) utilises several macro and micro level EA approaches along with environmental economics valuation technique called Travel Cost Method. The EA approaches have been known to quantify and some, monetize these environmental impact. Examples of methodologies within the Economics discipline that were develop for macro level EA are the System of Integrated Environmental and Economic Accounting (SEEA) (United Nation, 2003), National Accounting Matrix including Environmental Accounts (NAMEA) (de Haan & Kee, 2004; de Haan & Keuning, 1996), Environmental and Natural Resources Accounting Project (ENRAP) (Peskin & Delos Angeles, 2001), Index of Sustainable Economic Welfare (ISEW) (Daly & Cobb Jr, 1994) and Genuine Progressive Indicator (GPI) (Anielski, 2001). On the other hand, micro level EA methods which were developed by following approaches from the Accounting discipline could be claimed to be employ as a survival strategy to some businesses and marketing tactics to others. The well-known Triple Bottom Line (TBL) (Elkington, 1997) approach and others namely Sustainable Assessment Model (SAM) (Bebbington & Frame, 2003; Bebbington, Gray, Hibbitt, & Kirk, 2001) and Environmental Engineering Group Environmental Costing (EEGECOST) (de Beer & Friend, 2006) falls under this category.

The ESAS basically borrows several concepts from both levels EA namely the ISEW and GPI of the macro EA and Lifecycle Costing Assessment of SAM from the micro EA. The ESAS generates two main outputs; (1) Environmentally Sustainable Accounting Income

Statement (ESAIS) and (2) Environmentally Sustainable Accounting Balance Sheet (ESABS). The central idea of ESAIS is to estimate *real* income. Unlike conventional income estimation, the ESAIS takes accounts on environmental degradation elements while computing tourism site's earnings. It is important to note that, the greater number of tourists visiting a tourism site, the larger amount of solid waste produces. Unfortunately, incomes contributed by tourism activities failed to recognize the harmful effect of emissions from these solid wastes. Consequently, it is crucial to identify and monetize these impacts so that the estimation of tourism income could reflect both beneficial (income) and harmful (solid waste emissions) contribution of tourism activities.

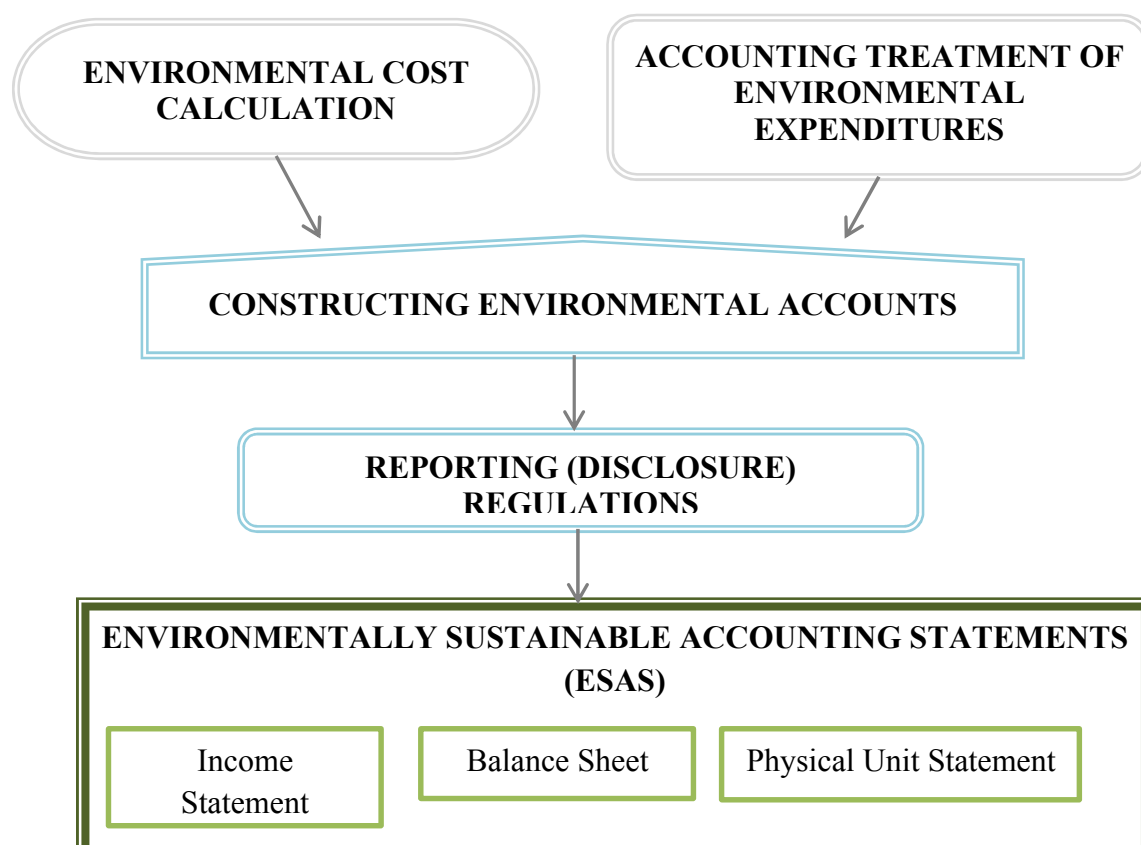
As for ESABS, it replicates the format of an organization's Balance Sheet which estimates the value of assets, liability and equity of a tourism site. However, contradictorily to traditional accounts, assets identified within the ESABS include non-market natural capital namely beaches, rainforest, caves and other environmental assets which were utilised for tourism activities as means of gaining income. These assets were sometimes exploited to the point of exhaustion or otherwise mistreated. In order to emphasize the depreciation/deterioration condition of these assets, it was suggested that this unsustainable usage should be measured in monetary terms within the ESAS. Even though the method has been operationalized for several applications, (Khalizul & Rosmini, 2011; Rosmini, Jamal, Patterson, & Forgie, 2009; Rosmini & Khalizul, 2011; Rosmini, Sharifah Robiah, et al., 2012), detailed techniques that measure environmental degradation such as methane (CH<sub>4</sub>) and natural assets' deterioration in financial unit, are yet to be developed.

## **METHODOLOGY**



The main objective of the study is to improve the Environmental Accounting Framework (Figure 1) by means of developing monetary measurements for the Environmentally Sustainable Accounting Statements (ESAS). The newly improved ESAS is later applied to a tourism site in Malaysia. Therefore, the research requires financial and non-financial information which are gathered through engagement mostly with tourists for collection of primary data. The study also utilises secondary data which are taken from local authority in order to develop monetary measurements as means of improving the ESAS.

Figure 1: Environmental Accounting Framework – ESAS (Simplified version)



Source: Rosmini, I., Forgie, V., & Khalizul, K. (2012), "Bridging the Environmental Accounting Gaps between Accounting and Economics Disciplines", *American Journal of Finance and Accounting*, 2,(4), pg. 303.

The ESAS was developed by Rosmini, Forgie & Khalizul (2012) specifically to estimate real return of a tourism site. It follows the structure of business accounting financial statements

but draws concepts from the environmental economics valuation, economics accounting (macro EA) with slight influence from the cost accounting areas. There are several important steps in constructing ESAS. (1) Calculating environmental cost; (2) Determining nature of expenditure; and (3) Constructing environmental accounts. The construction of ESAS utilizes accounts from Step 3 which was slightly follows disclosure regulations from the accounting convention as in Step 4. In general, ESAS consists of three main output/statements; the Environmentally Sustainable Accounting Income Statement (ESAIS), Environmentally Sustainable Accounting Balance Sheet (ESABS), and the Environmental Physical Unit Statement (EPUS). The ESAIS portrays income received after taking account degradation elements as 'maintenance cost' of tourists' namely solid waste, liquid waste and carbon emissions. The ESABS on the hand illustrate both financial and environmental assets, liabilities and equities. In a way, it is hoped that the ESABS can be used as indicator for tourism site's sustainability.

Unlike conventional accounts (business level) the ESAIS (Figure 2) incorporates environmental elements (degradation). It still however, follows the structure of the conventional business accounts which displays revenues and expenses items. Since the tourism sector were mostly dependent on the attraction of natural assets, it is only fitting that a method/tool from the environmental accounting area was developed dedicate to a tourism site. Even though ESAS/ESAIS was specifically developed for tourism sector, it still borrows concepts from national level environmental accounting approaches namely ISEW and GPI. Since the business level environmental accounting area does not incorporate the environmental expenditures (e.g. degradation of the environment) directly into its Income Statement, the income calculated in the ESAIS represent environmentally sustainable income (partly following ISEW/GPI). Several features of ESAIS can be perceived as representing the

environment more accurately for a tourism site. Through ESAIS, it can be illustrated that the income received from tourism activities must be equally met with maintaining and protecting the environment. If these actions are not pursued, the ESAIS will illustrate unfavourable outcomes in regard to the total income.

Figure 2: Environmentally Sustainable Accounting Income Statement (ESAIS)

TOURISM SITE XX	
ENVIRONMENTALLY SUSTAINABLE ACCOUNTING INCOME STATEMENT FOR THE	
YEAR ENDED 20XX	
MYR `000`	
	REVENUE
	Accommodation & Food Services
	Transportations
	Entertainment & Cultural Services
	Travelling & Tour Services
	Retail Services
	Miscellaneous Services
(-)	COST OF SALES & EXPENSES
	Accommodation & Food Services
	Transportations
	Entertainment & Cultural Services
	Travelling & Tour Services
	Retail Services
	Miscellaneous Services
(-)	ENVIRONMENTAL EXPENSES (POLLUTANTS)
	Solid Waste
	- Direct
	- Indirect (CH4)
	Liquid Waste
	Carbon Emissions
(-)	PROFIT ATTRIBUTES TO SHAREHOLDERS
	DIVIDENDS
	UNAPPROPRIATED PROFIT BROUGHT FORWARD
	UNAPPROPRIATED PROFIT CARRIED FORWARD

Source: Rosmini, I., & Khalizul, K. (2011). Taking Nature into Account: Applying Environmental Accounting Approaches in the Tourism Sector, Hospitality and Hotel Management Symposium, Konya, Turkey

Meanwhile ESABS is a response to **Dorweiler & Yakhou (2005)** recommendation that proposed Environment's Balance Sheet (EBS) as a way to report the owner's equity position

on a worldwide basis.. The foundation of ESABS is inspired by the EBS. However, there are several departures of ESABS with the original EBS in regards to the environmental assets categories. The EBS does not incorporate valuation on natural or non-market assets (such as beaches, rivers, lakes, recreational park and etc. that may be the source of income of the entity). The recognition for reporting & disclosure of the EBS only includes environmentally-based assets such as regulation-generated assets (expenses and liability related to environmental regulation compliance) and environmental market assets (environmentally related product cost such as design of environmental product for sustainability, equipment to re-manufacture and re-use). Since, the recreational natural assets may be the reason for the entity to be in business (e.g. resorts, travel agencies, recreational transportations and etc.), it is essential for the assets to be accounted in the Balance Sheet. There is however, an issue of quantification. This problem, can be solved by using option value non-market valuation techniques as highlighted by Schilizzi (2002).

The ESABS displays financial information of assets and liabilities (as in conventional balance sheet) of companies/businesses including local authority that involve in the tourism activities (Please refer to Figure 3). These include businesses that offer services such as accommodation, food and beverages, transportation, travelling, entertainment, retail and others. The detail information for this can be taken from their annual report or financial statements.

Figure 3: Environmentally Sustainable Accounting Balance Sheet (ESABS)

<b>ENVIRONMENTALLY SUSTAINABLE ACCOUNTING BALANCE SHEET OF XX ISLAND AS AT 20XX</b>			
<b>FINANCIAL ASSETS</b>	<b>RM</b>	<b>FINANCIAL LIABILITIES</b>	<b>RM</b>
<b>FIXED ASSETS</b>		<b>CURRENT LIABILITIES</b>	
Accommodation & Food Services		Accommodation & Food Services	
Transportations		Transportations	
Entertainment & Cultural Services		Entertainment & Cultural Services	
Travelling & Tour Services		Travelling & Tour Services	
Retail Services		Retail Services	
Miscellaneous Services		Miscellaneous Services	
<b>INTANGIBLE ASSETS</b>		<b>LONG TERM LIABILITIES</b>	
Accommodation & Food Services		Accommodation & Food Services	
Transportations		Transportations	
Entertainment & Cultural Services		Entertainment & Cultural Services	
Travelling & Tour Services		Travelling & Tour Services	
Retail Services		Retail Services	
Miscellaneous Services		Miscellaneous Services	
<b>CURRENT ASSETS</b>		<b>TOTAL FINANCIAL LIABILITIES</b>	
Accommodation & Food Services		<b>ENVIRONMENTAL LIABILITIES</b>	
Transportations		<b>ENVIRONMENTAL DEGRADATION</b>	
Entertainment & Cultural Services		Environmental penalties	
Travelling & Tour Services		<i>*Depreciation on natural assets</i>	
Retail Services		Cleaning up hazardous waste site	
Miscellaneous Services		<b>TOTAL ENVIRONMENTAL</b>	
<b>TOTAL FINANCIAL ASSETS</b>		<b>LIABILITIES</b>	
<b>ENVIRONMENTAL ASSETS</b>		<b>FINANCIAL EQUITIES</b>	
<b>NATURAL ASSETS</b>		<b>SHARES</b>	
Beaches/Coastlines		Accommodation & Food Services	
<i>(-) Depreciation</i>		Transportations	
Coral Reefs/Marine Park		Entertainment & Cultural Services	
<i>(-) Depreciation</i>		Travelling & Tour Services	
<b>REGULATION GENERATED ASSETS</b>		Retail Services	
Environmental control equipment		Miscellaneous Services	
Beautification of natural assets		<b>PROFIT &amp; LOSS ACCOUNTS</b>	
Environmental protection activities		<b>ENVIRONMENTAL EQUITIES</b>	
<b>ENVIRONMENTAL MARKET ASSETS</b>		<b>TOTAL ENVIRONMENTAL &amp; FINANCIAL EQUITIES</b>	
Environmental costs – R & D			
Equipment to produce environmental product, recycle and etc			
<b>TOTAL ENVIRONMENTAL ASSETS</b>			
<b>TOTAL ASSETS</b>		<b>TOTAL LIABILITIES &amp; EQUITIES</b>	

## *IMPROVING THE ESAS*

### *A. Developing Technique of Converting Physical Unit of Methane (CH<sub>4</sub>) from Solid Waste into Monetary Value*

ESAS may invite criticisms due to the act of monetizing degradation where some argued that dollar terms could not possibly be capable of capturing the whole impact on the environment. However, it is important to stress the main notion of ESAS is to estimate 'maintenance cost' of tourists and illustrate the fraction of these costs from revenue generated through tourism activities. ESAS in Figure 2 illustrates three types of tourist maintenance costs which are solid waste, liquid waste and carbon emissions.

There are two types of estimation of solid waste (1) direct – financial consequence of collecting and disposing solid waste into landfills; and (2) indirect - estimating and converting physical unit of methane (CH<sub>4</sub>) released from landfill to financial unit. The technique to be developed (converting physical unit to financial unit), will be one of the main contributions of this study. Even though, the current focus of the study is to estimate and convert CH<sub>4</sub>, in the near future, other GHG will be included.

Methane emission from solid waste at landfills can be estimated through several techniques such as in-situ CH<sub>4</sub> measurements, IPCC 1996 Default Methodology (DM), Modified Triangular Method (MTM) and First Order Decay (FOD) (Chakraborty, Sharma, Pandey, Singh, & Gupta, 2011). Since the author is not from the waste management field, therefore it is most likely that the author will utilize the Waste Reduction Model (WARM) (Environmental Protection Agency, 2013) excel spreadsheets as means of calculating GHG emissions. However, the author is capable of conducting waste audits at the tourism site in order to

gather data as input to the WARM. The author also considering estimating solid waste emissions from life cycle inventory approach as suggested in El Hanandeh (2010).

### ***B. Develop Monetary Depreciation Method for Natural Assets***

As mentioned in previous sections, depreciation of natural assets requires evaluation of two established approaches namely Tourism Carrying Capacity and Ecological Footprint. The main idea of depreciating natural asset is that if its usage exceeded its carrying amount, the condition may deteriorate. The assets' usage limit can be determined either conducting the TCC analysis.

Since there are several dimensions of TCC, this study intends to apply only environmental dimension in order to align with the main objective of ESAS itself. It is important to note that, TCC assessments of Perhentian Island only focus on natural assets that signify the Island which are beaches and coral reefs. For this, two factors; human values and crowdedness will be taken into consideration to determine the threshold capacity. Secondary data will be the main source for this study. Data for tourism activities crowdedness such as snorkelling and diving can be obtained from tour operators. Interviews with divers' instructors and tour operators will be conducted to assess Perhentian Island's tourists' values towards the assets. Two extreme cases for human values (immoral and good) will be inserted as variables to arrive at two possible outcomes of maximum number of tourists can be accommodated by these assets. The average number of maximum visitors that the assets can carry will be set as the limit. Any exceeding number of tourists will be used as depreciation amount.

The challenge would be to put dollar/ringgit value on the depreciation amount. The author believes there are two reasonable approaches to do this. (1) The number of exceeding visitors multiplied by the average per tourists spending. or (2) Adopting the EF method of calculating the exceeding number of tourists to their footprint and later the footprint equivalent land areas were converted into dollar/ringgit by estimating the market value for land in Perhentian Island. The author prefers the number (1) approach since it directly signify the amount of income Perhentian Island could lose if the assets were not properly treated. However, the author is open for any suggestive comments.

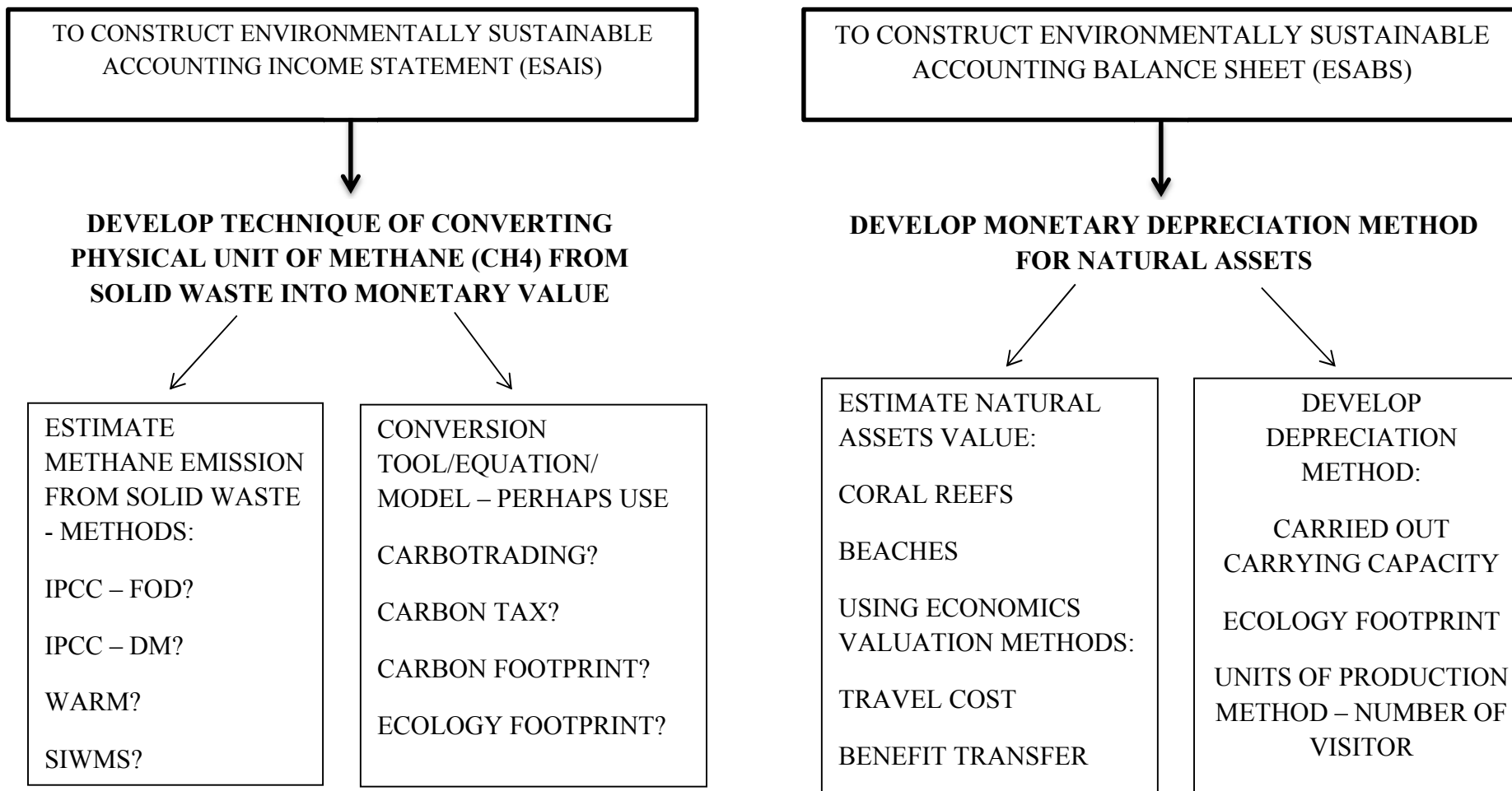
## **CONCLUSIONS**

In general, this paper proposes several techniques to be considered in developing monetary measurements to account for natural assets degradations and to covert physical value of methane (CH<sub>4</sub>) into monetary value. These measurements later will be inserted into the Environmentally Sustainable Accounting Statements to account for Perhentian Island's tourism return. Figure 4 illustrated the overall workflow of the study's proposal for monetary measurement techniques. It outlines the possible techniques or methods that can be adapted into the ESAS framework.

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Figure : Workflow of **Developing Monetary Measurements for Environmentally Sustainable Accounting Statements Framework**



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